

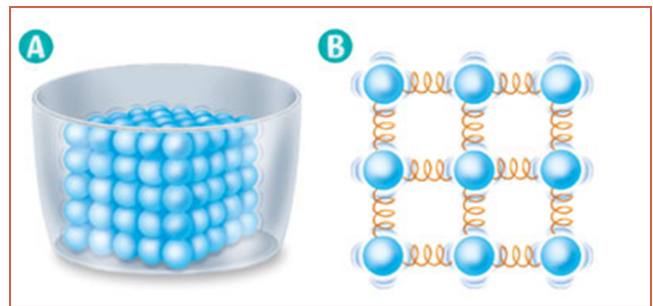
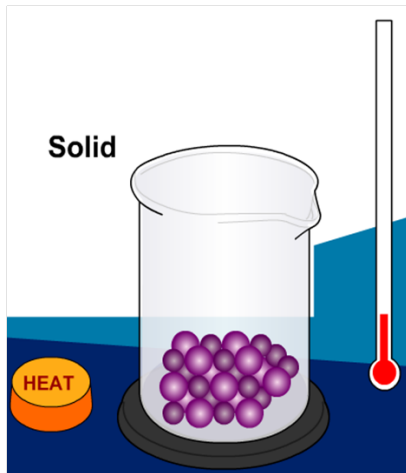
States of Matter:

- Matter: Anything that has mass and takes up space
- 5 States of Matter: ^(Least Energy)
Coldest
 - Bose-Einstein Condensate (BEC) 10^{-6} K
 - Solids
 - Liquids
 - Gases
 - Plasma (Most Energy) ↓
Hottest
- Each state is designated by the movement and behavior of particles



- Kinetic Theory of Matter:
 - Temperature is determined by the kinetic energy of a substance
 - 3 Parts of the Kinetic Theory
 1. All matter is composed of small particles (atoms, molecules, ions).
 2. Particles are in constant, random motion.
 3. Particles collide with each other and the walls of the container.

- Solids



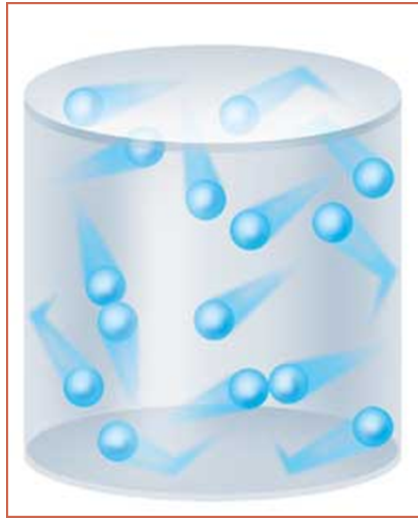
- Particles are very closely packed
- Do not move very much → simply vibrate in place
- Definite shape and definite volume

- Liquids



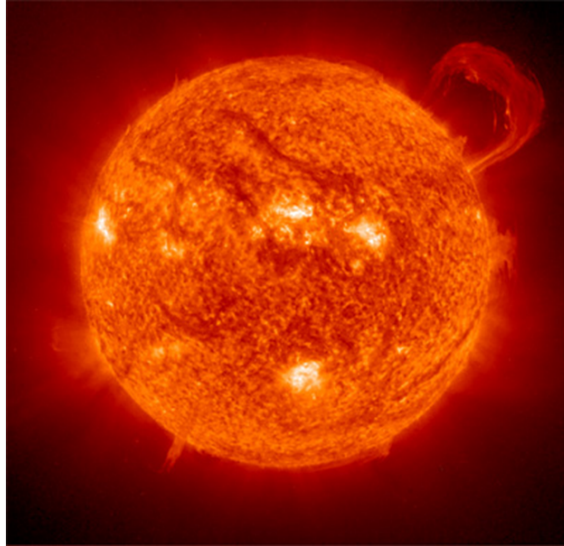
- As energy of the particles increases, the particles are liberated from the bonds holding them together as a solid
- Particles have space between them
- Particles flow around each other
- No definite shape, yes definite volume

- Gases

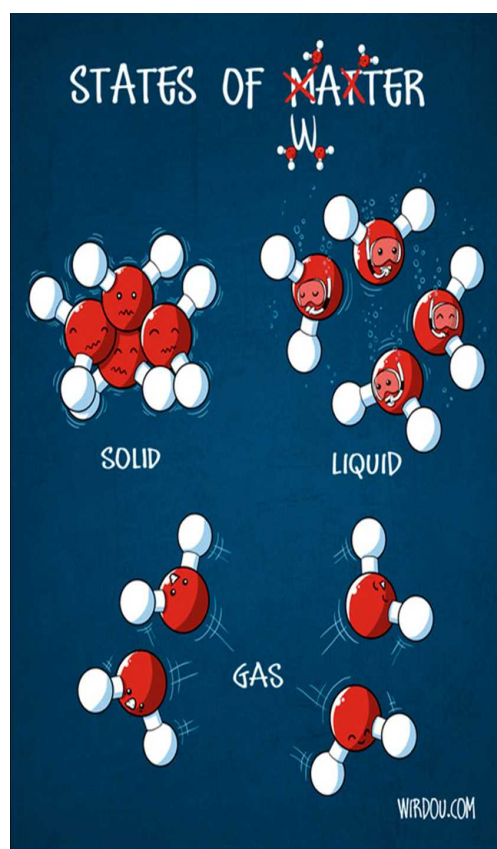


- As the energy of the particles increases, the particles move much, much more than what they were able as a liquid
- Particles move very freely and quickly (compared to liquids and solids)
- No definite shape or volume

- Plasma



- Electrically charged gas
- It is created at very high energies (measured temperatures of $> 10,000$ K)
- Lightning is another example
- Most abundant type of matter in the universe, just not on Earth



- Changes in State:
 - Caused by increasing or decreasing the energy
- Increase energy → measured temperature increases and molecules move faster and spread out
- Decrease energy → measured temperature decreases, molecules move more slowly and get closer together